

FIG. 1

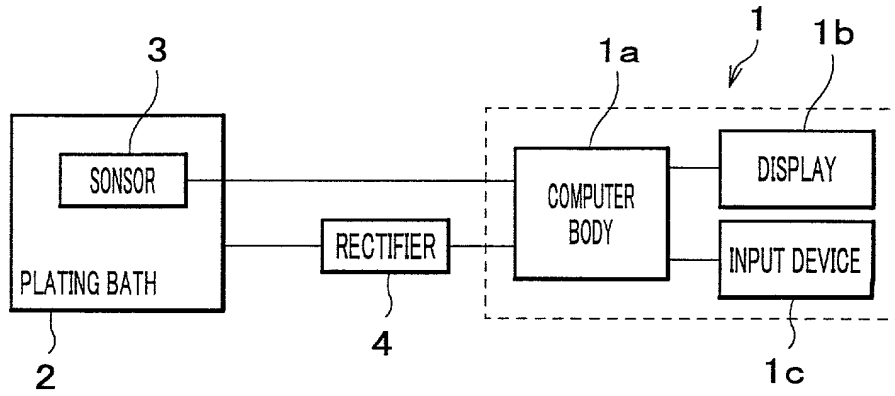


FIG. 2

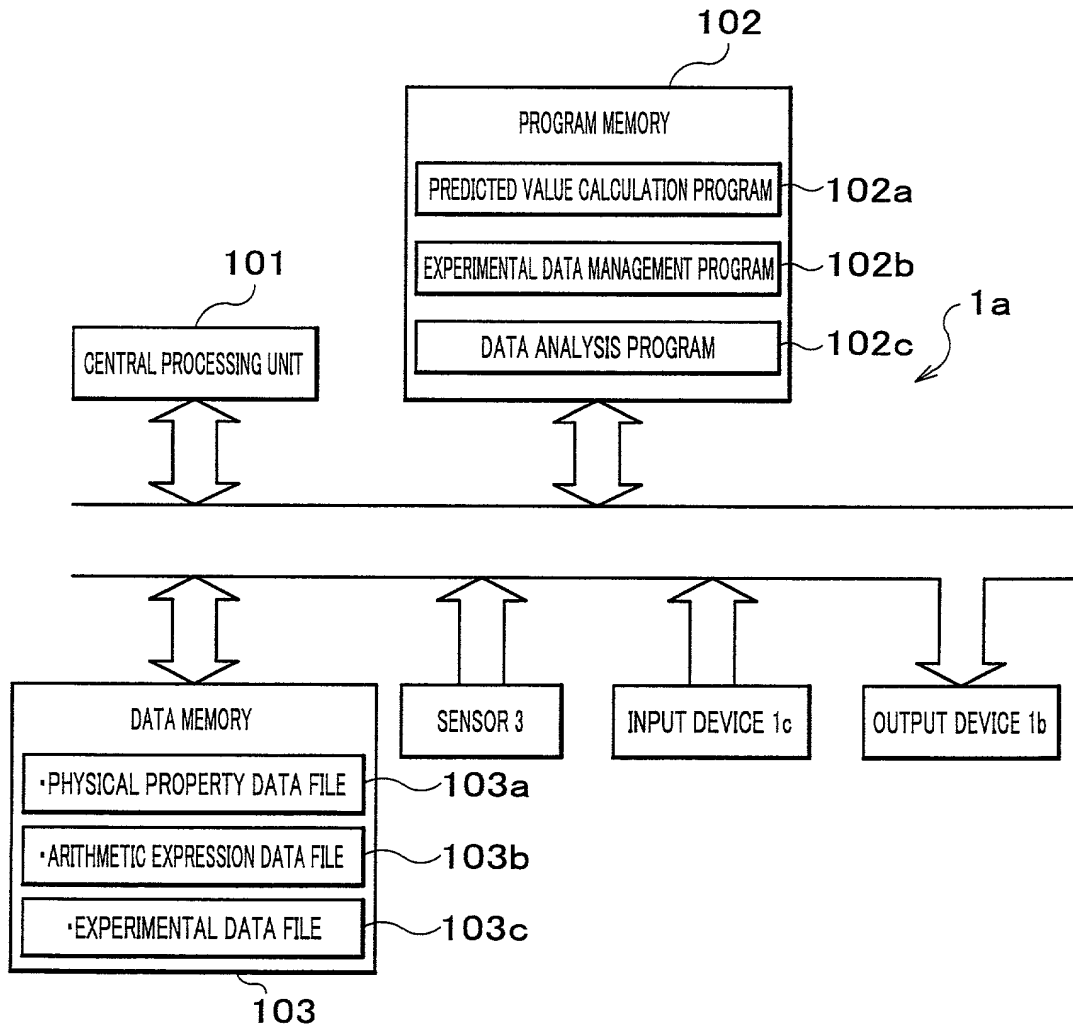


FIG. 3

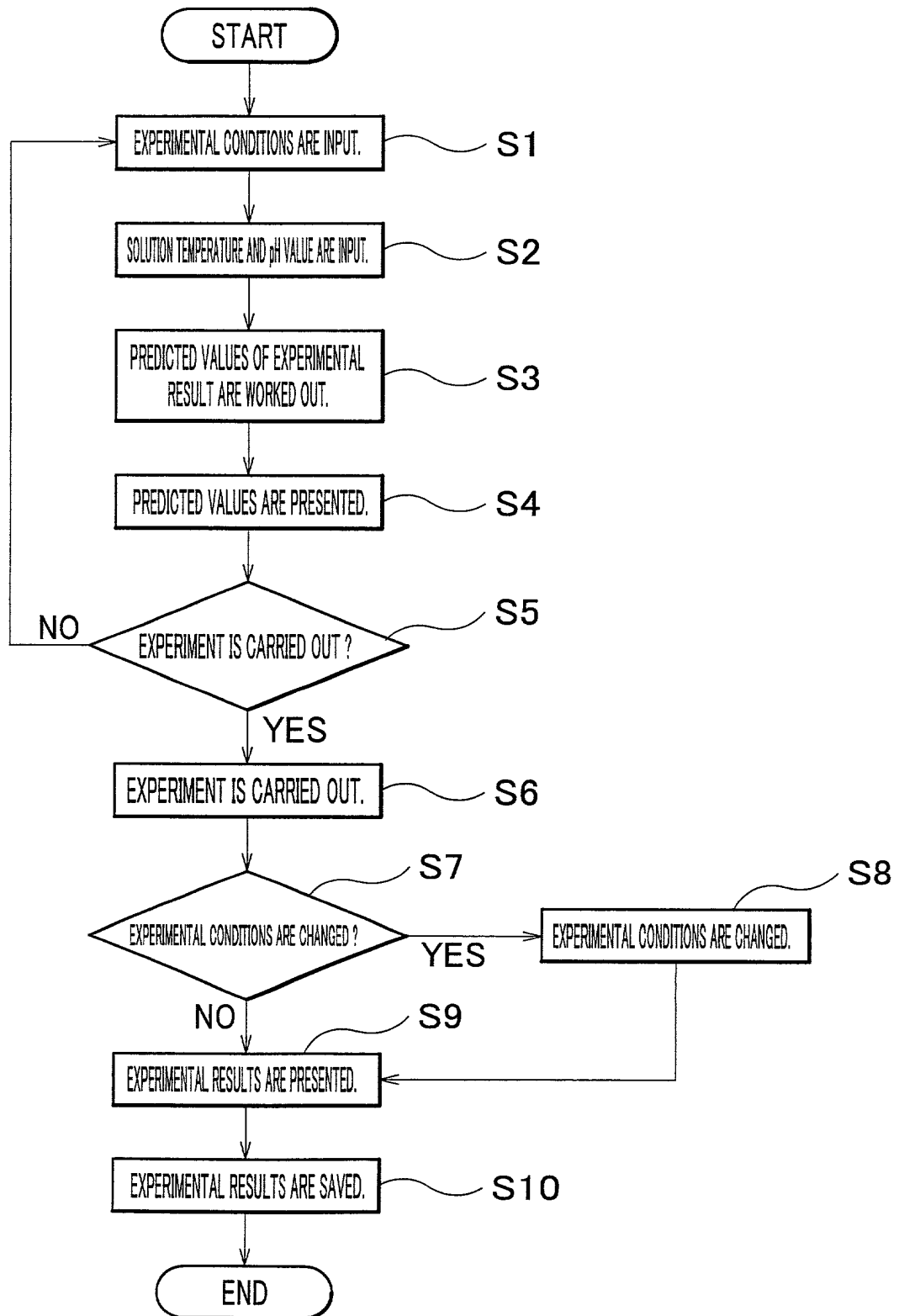


FIG.4

SETTING VALUE INPUT FORM

NAME OF EXPERIMENT **DATE**

FILE NAME SAVED **NAME OF PERSON**

NAME OF PLATING SOLUTION

TYPE OF PLATING SOLUTION **RECONFIGURATION OF PLATING SOLUTION**

CONDITIONS OF ITEMS TO BE PLATED

☒ NAME

☐ MATERIAL

☐ SURFACE AREA

☐ PRE-PLATING WEIGHT

PLATING CONDITIONS

☐ SET TEMPERATURE °C

☒ MAXIMUM ELECTRIC CURRENT VALUE A

☒ PLATING TIME S

ADJUSTABLE ELECTRIC CURRENT MODE SETTING ☒

STAGE	ELECTRIC CURRENT TIME(S)	ELECTRIC CURRENT VALUE (A)
A	10	0.500
B	10	1.000
C	40	2.000

INTEGRATED ELECTRIC CURRENT VALUE

PREDICTED ELECTRIC CURRENT SCHEDULE

SOLUTION TEMPERATURE °C **pH VALUE** pH

COMMENT

FIG.5A

5g

Not Specified	▲
Copper Cu^{2+}	
Nickel Ni^{2+}	
Chrome Cr^{6+}	
Tin Sn^{2+}	
Gold Au^+	
Specified	▼

FIG.5B

5j

RECONFIGURATION OF PLATING SOLUTION	
NAME	Ni^{2+} (Nickel)
VALENCE	2
GRAM-EQUIVALENT WEIGHT	29.346
DENSITY(g/cm3)	8.85
ELECTROCHEMICAL EQUIVALENT(mg/coulomb)	0.3041

Press 'Yes' to enter the above data

Yes No

FIG.5C

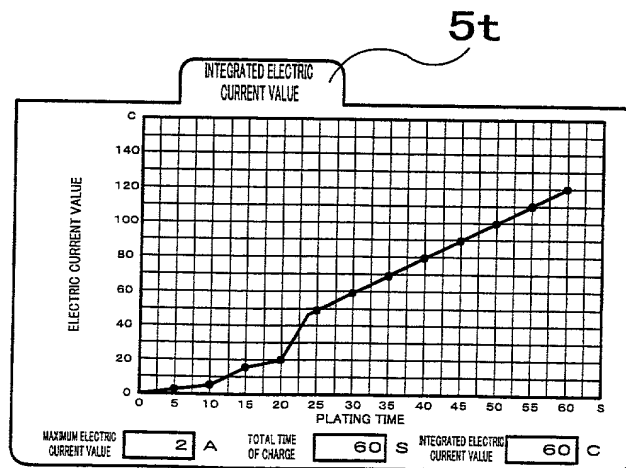


FIG.6

6

EXPERIMENTAL PREDICTION FORM

NAME OF EXPERIMENT	Wafer Experiment No. 001	WAFER-NI001	YAMAMOTO, Wataru	10 November, 2000
NAME OF PLATING SOLUTION	Nickel-plated-Sulfamic Acid Solution		NAME OF ITEM	Wafer Specimen
CURRENT CONDITIONS OF PLATING SOLUTION		MATERIAL OF ITEM		
SOLUTION TEMPERATURE 45 °C pH VALUE 5.4 ph		SI/Ti/Cu		

☐ PREDICTED ELECTRIC CURRENT EFFICIENCY
94 %

START TEMPERATURE REGULATION
 STOP TEMPERATURE REGULATION

6a

PREDICTED AVERAGE PLATING THICKNESS (as cathode electric current efficiency is 94%)

PLATING THICKNESS (μm)

6b

PREDICTED PLATING WEIGHT (as cathode electric current efficiency is 94%)

PLATING WEIGHT (g)

RETURN TO SETTING VALUE INPUT FORM

OK

CANCEL

FIG. 7

7c 7d 7e 7f 7g

EXPERIMENT FORM

NAME OF EXPERIMENT	Wafer Experiment No. 001	WAFER-Ni001	YAMAMOTO, Wataru	10 November, 2000
NAME OF PLATING SOLUTION	Nickel-plated-Sulfuric Acid Solution		NAME OF ITEM	Water Specimen
			MATERIAL OF ITEM	Si/Ti/Cu

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FIG.8

8c
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8g

EXPERIMENTAL RESULT ANALYSIS FORM

NAME OF EXPERIMENT: Wafer Experiment No. 001

NAME OF PLATING SOLUTION: Nickel-plated-Sulfamic Acid Solution

CHANGE IN ELECTRIC CURRENT VALUE:

CHANGE IN VOLTAGE VALUE:

NAME OF ITEM: Wafer Specimen

NAME OF ITEM: Wafer-Ni001

CHANGE IN SOLUTION TEMPERATURE:

CHANGE IN INTEGRATED ELECTRIC CURRENT VALUE:

YAMAMOTO, Wataru

10 November, 2000

CHANGE IN PLATING THICKNESS:

CHANGE IN PLATING WEIGHT:

8b

8a

INPUT RESULT

PRE-PLATING WEIGHT: g

POST PLATING WEIGHT: g

DEPOSITED PLATING WEIGHT: g

OK

AVERAGE CATHODIC ELECTRIC CURRENT EFFICIENCY: %

FINAL AVERAGE PLATING THICKNESS: μm

ELECTRIC CURRENT VALUE: A

VOLTAGE VALUE: V

HYDROLYTIC CURRENT VALUE: C

SOLUTION TEMPERATURE: $^{\circ}\text{C}$

pH VALUE: pH

PLATING THICKNESS: μm

PLATING WEIGHT: g

CHANGE IN PLATING THICKNESS

Plating Time (S)	Plating Thickness (μm)
0	0.00
5	0.25
10	0.44
15	0.70
20	0.95
25	1.60
30	1.90
35	2.07
40	2.15
45	2.20
50	2.24
55	2.31
60	2.48

CALIBRATED IN SECONDS

TO EXPERIMENTAL RESULT NUMERIC VALUE FORM

FIG.9

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EXPERIMENTAL RESULT NUMERICAL VALUE FORM

NAME OF EXPERIMENT		Wafer Experiment No. 001		WAFER-N001		YAMAMOTO, Wataru		10 November, 2000	
NAME OF PLATING SOLUTION		Nickel-plated-Sulfamic Acid Solution		NAME OF ITEM		Water Specimen		MATERIAL OF ITEM	
								Si/Ti/Cu	
PLATING TIMES	ELECTRIC CURRENT VALUE	VOLTAGE VALUE	TEMPERATURE VALUE	SOLUTION TEMPERATURE	pl VALUE	PLATING THICKNESS	PLATING WEIGHT		
0	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
1	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
2	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
3	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
4	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
5	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
6	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
7	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
8	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
9	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
10	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
11	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
12	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
13	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
14	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
15	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
16	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
17	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
18	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
19	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
20	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
21	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
22	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
23	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
24	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
25	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
26	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
27	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
28	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
29	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
30	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
31	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

SAVE IN CSV FORMAT